Agricultural Improvement Council for England and Wales

FOURTH REPORT

1956—59

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MEMBERSHIP AND TERMS OF REFERENCE

The members of the Council during the period June 1956 to June 1959, were:

Sir Alan Hitchman, K.C.B. (*Chairman up to April* 1959)
A. J. D. Winnifrith, Esq., C.B. (*Chairman from April* 1959)
Professor Sir Frank Engledow, C.M.G., M.A., B.Sc., F.R.S. (*Vice-Chairman*)
Captain J. F. Bomford, M.C.
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Professor E. G. White, D.Sc., Ph.D., F.R.C.V.S.
W. Morley Davies, Esq., M.A., B.Sc., F.R.I.C. (*Secretary*)

The Council's terms of reference are:

"To keep under review the progress of research with a view to ensuring that promising results are applied as rapidly as possible to the problems of agriculture and horticulture and that these and any other new technical methods are incorporated into ordinary commercial practice; to advise from time to time concerning agricultural and horticultural problems which appear to require scientific investigation; and to advise generally as to the lines on which a policy designed to raise the technical standard of agricultural and horticultural production can best be implemented."

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Agricultural Improvement Council for England and Wales

INTRODUCTION

To The Rt. Hon. John Hare, O.B.E., M.P.
Minister of Agriculture, Fisheries and Food

Sir,

1. The Agricultural Improvement Council was appointed by the Minister of Agriculture and Fisheries in 1941. It reported in 1942, 1950 and 1956 and now presents its Fourth Report.

2. The broad pattern of the Council's work has continued to be governed by the demands made of the agricultural industry and the scientific developments, techniques, and methods of husbandry that are available to assist farmers in meeting them. The industry has continued to maintain a high level of production and to enjoy overall stability of prices. The main aims have continued to be to raise efficiency by reducing costs and by improving quality and market presentation of produce. The Council has accordingly given attention to increasing home produced feed for livestock, especially the utilization of grass; to feeding standards for livestock; to farm management with special reference to work study; and to the development of special techniques such as irrigation. The Council was closely interested in the review of the Ministry's Regional organization that took place following the report of the Arton Wilson Committee in 1956. It particularly welcomed the continuance of County Agricultural Executive Committees with emphasis on the promotion of technical development, and those changes affecting the National Agricultural Advisory Service that have enabled the service to devote its energies more fully to advisory work.

PART I

ORGANIZATION AND PROCEDURE

3. Following its reconstitution in 1956, the Council reviewed its Committee structure with a view to improving its efficiency. Some changes were made, among them the setting up of an Agriculture Committee to keep the Council advised of major trends in agriculture as they affected farming systems and to make recommendations for the development of promising research results. The Council also reconstituted the Poultry and Horticulture Groups as Committees, with parallel functions to those of the Agriculture Committee.

4. In view of the limitations imposed by its terms of reference in regard to economic matters, the Council decided in November, 1956, that the Ownership

Economics Sub-Committee should be discontinued and that the Land Management Committee itself should be responsible for considering any economic aspects that arose from the work of its Sub-Committees. The Land Management Committee was strengthened for this purpose by the appointment of four additional members, all of whom had been members of the Ownership Economics Sub-Committee.

In May, 1957, additional members were appointed to the Poultry Committee and it was given responsibility for advising on the scientific aspects of the Poultry Progeny Testing Stations and the Poultry Stock Improvement Scheme as a whole.

In November, 1958, the Horticulture Committee set up a Bee Husbandry Sub-Committee to advise on bee-keeping matters, with the exception of pests and diseases which are the concern of a statutory committee.

5. Ad hoc Committees have been set up to consider the technical problems of Welsh Agriculture; the supply of trained people for poultry work; and sheep recording and progeny testing. Reference to these Committees is made in later paragraphs.

6. A list of the members and terms of reference of the Council's main Committees is at Appendix A and a chart showing the complete committee structure is at Appendix B.

7. The Council continues to be deeply indebted to those farmers, members of teaching institutions and research stations, members of the advisory services, and others with specialized knowledge who freely give their time and energies to its Committees and Sub-Committees.

8. While the majority of matters that come before the Council are of a technical or scientific nature, it has, from time to time, to take into consideration aspects of education in order to make recommendations that will ultimately ensure a supply of people, skilled in the appropriate disciplines, to take up posts in advisory services where a specialized knowledge is needed. In this context the Council has considered the provision of facilities for teaching poultry husbandry, as well as training for research.

9. While specific problems of agricultural economics, such as price levels, grants and subsidies, do not directly come within the Council's sphere it must and does concern itself with "economic" aspects in the broader sense of the word. Farming is primarily a business, and there is an increasing appreciation of the importance of putting new developments into use and deriving the fullest economic benefits from existing techniques. Farm management and the application of work study to agriculture, for example, are matters to which the Council has devoted much attention. The importance of taking into account economic aspects when making recommendations for research or experimental work has also been recognised by the appointment of economists to a number of its Committees and Sub-Committees. The Ministry's Chief Farm Management Adviser regularly attends Council meetings.

10. The Council has continued to keep in close touch with agricultural research centres and with the Scottish Agricultural Improvement Council, and also to give its views to the Ministry on problems encountered by the N.A.A.S. Recruitment is one of these; and the Council is convinced that there should be no lowering of the present high standards of entry. Without high standards, the confidence of the farming community in the service would not be maintained.

REVIEW OF PROBLEMS REQUIRING INVESTIGATION

11. The systematic review of the industry's technical problems which is being undertaken by the Joint Committee of the Agricultural Improvement Councils for England and Wales and Scotland and the Agricultural Research Council was described in the Council's Third Report. The Committee expects to complete its first examination of the major commodities by the end of 1959. It has dealt with Milk; Pigs; Poultry; Sheep; Wool; Barley; Oats; Wheat; Grassland; Potatoes; Sugar Beet; Peas; Vegetables; Apples; Cherries; Pears and Plums; Soft Fruit; Bulbs; and Flowers. The remaining commodities are Beans; Forage Crops; Root Crops and Brassicas for Stock Feed; and Meat. Outside the commodity field, the Committee has reviewed the problems of Shelter and proposes to examine Drainage and Irrigation. Thereafter, each commodity will be reviewed at an interval of about five years.

12. The findings of the Committee are remitted to the A.R.C. in form of detailed statements of problems (breeding, diseases etc.) annotated to indicate an assessment of the adequacy of research on each of them. The Committee has found that research on the majority of problems is adequate in the sense that the subject is receiving a fair share of the manpower and facilities available. An analysis of the first twelve commodities reviewed shows that at one end of the scale the greatest deficiencies are in the fields of animal and potato research; and at the other, cereal problems are, with certain exceptions e.g. eelworm, relatively well covered. The Committee has noted with satisfaction that the A.R.C. already has special technical committees on Pigs, Poultry, and Potatoes.

13. Committee on the Technical Problems of Welsh Agriculture. At the request of the Minister, the Council appointed a Committee in October 1956 under the Chairmanship of Sir Frank Engledow with the following terms of reference:

> "To review the technical problems of agriculture in Wales and to advise whether there are any particular matters requiring further research to which the attention of the Agricultural Research Council and the Ministry should be invited."

14. The Committee's report was received by the Council, and published by H.M. Stationery Office on 18th December, 1958. The Committee found no evidence of major fundamental research problems peculiar to Wales but drew attention to a number of problems, including husbandry problems, which are common to high rainfall, high altitude areas in England and Scotland as well as Wales. These include manurial requirements, drainage, and certain animal diseases and disorders. The Committee considered that further work needs to be done on some of these problems and action on its recommendations is being planned in the light of the views of the Agricultural Research Council and interested organizations.

PART II

EXPERIMENTAL WORK UNDER THE COUNCIL'S GUIDANCE

15. The Council is responsible under this heading for the work carried out by the National Agricultural Advisory Service at the Ministry's Experimental

Husbandry Farms and Experimental Horticulture Stations. It also covers experimental work carried out by the N.A.A.S. at Regional Centres and on commercial farms.

Experimental Husbandry

16. Experimental Husbandry Farms. The Council has recently reviewed the need for the additional Farms contemplated under the original scheme. It considers that in order to give the requisite representation of farming systems, soils and climatic conditions, the following would be suitable acquisitions from any funds which may be made available for the purpose:

Area	*Soil Type*	*Notes*
East Anglia	Black Fen	Possibly with one or two out-stations
Gloucestershire	Oolitic limestone	Cotswold farm
Northern Counties	Medium	Hill and stock rearing
Somerset	Clay	Low rainfall area

The Council has considered the need for a special centre of national character devoted to livestock trials and investigations. The primary purpose of such a centre would not be husbandry experiments but investigations centred on cattle such as progeny testing. It was felt that there was a strong case for a centre of this kind and that it should take priority over the acquisition of any further Farms.

17. Experimental Work in Progress. The number of experiments and observation studies carried out in 1956 and 1958 may be grouped under the following broad headings:

	At Experimental Husbandry Farms		*In N.A.A.S. Regions*	
	1956	1958	1956	1958
Cereals (and pulses)	54	75	450	445
Grassland (including lucerne and clover)	22	39	363	387
Potatoes, root and fodder and other crops	29	37	390	288
Long-term rotation, soil fertility trials	35	36	33	42
Cattle	20	36	35	31
Sheep	9	16	2	41
Pigs	5	6	5	10
Poultry	5	7	3	8

These figures show an increased emphasis on grassland and on livestock problems, both on the Farms and in the Regions. As would be expected, the bulk of the critical work with animals is centred on the Husbandry Farms owing to the difficulty of carrying out livestock trials on commercial holdings.

18. The following paragraphs illustrate the development of experimental work by references to some of the more important projects.

Animal Experiments on Experimental Husbandry Farms

19. Dairy heifer rearing. Experiments and experience in various parts of the world have given rise to conflicting views as to the best level of nutrition of heifers; a moderate level is commonly favoured. Accordingly, an experiment was designed to study this point. It was started on three Farms some years ago but can be carried on to completion only at one because disease and other causes have upset the work at the other two. The results of research work on the nutrition of dairy cattle in the U.K. and overseas have been reviewed, and it has been decided to make a fresh start on a simpler experiment at the same three Farms. This will compare the results of feeding groups of dairy heifers during the first 6-8 months of life on a fairly generous diet with similar groups kept on a lower plane of nutrition than the moderate level of the previous experiment.

20. Selection for beef production. In the past much attention has been devoted to the testing of dairy bulls in order to pick out those of value in improving milk yields, and during recent years this has been given a fresh impetus by the spread of artificial insemination. In the case of beef breeds, selection has been mainly by external characteristics and little work has been done on the scientific evaluation of the merits of different bulls of the same breeds. In consultation with the Institute of Animal Genetics, the Milk Marketing Board, and the Fatstock Marketing Corporation, it was decided that as such a large proportion of home-produced beef must come from dairy herds, the most important project to be tackled was a study of the differences between beef bulls when crossed with dairy cows. Accordingly, a programme is under way at the Rosemaund Farm in which beef bulls are purchased as calves, and their performance for the first 12-14 months in terms of liveweight gains and food conversion is recorded. These bulls will then be used at certain A.I. centres and a selection of their progeny from Friesian cows brought back to the Rosemaund and High Mowthorpe Farms for testing right through to slaughter. If the correlation between the bull's own performance and that of his progeny is as good as is believed in some quarters, it will be possible to reduce the test period to one of some 12 months or so. This presumes a selection based on characteristics which can be measured on the live animal.

21. Calf rearing. The high cost of rearing calves, both for milk production and for beef, has led to a number of experiments being designed to study methods of effecting economies in calf rearing. Various milk substitutes have been successfully used, including the addition of oat flour to dried skim milk; and the success of the early weaning system has been confirmed. Trials at Trawscoed with formalin treated liquid skim milk were giving encouraging results until supplies of liquid skim milk ceased. There has been a good deal of interest in expanding the output of veal and experiments were carried out at five Farms, primarily to ascertain whether it was possible to distinguish the carcases of calves fed on whole milk only from those receiving milk substitutes. The management of the calf during its first spring to avoid the check on turning out, and the practicability of rearing calves on grass from an early age, are among other topics being studied.

22. Grazing experiments. The utilization of grassland by grazing animals is receiving considerable attention, but the planning and execution of work is difficult because of the number of variables and the small number of stock that can be used. A mixed stocking trial is in progress at three Farms to compare different intensities in cattle with and without additional sheep on a basis of the liveweight production per acre and taking into account the progress of the individual animals.

23. At Great House, after a four-year comparison of the milk produced from an area under a ley with a comparable area of good old pasture, it was clear that although the ley in the second and third years slightly out-yielded the permanent pasture it was not likely to make up the lower production during its establishment year; part of this low yield was obviously due to the bad poaching of the ley in its first year. This conclusion, if confirmed, has very important implications, and the trial is being repeated with permanent pastures of varying quality where parts are ploughed up and reseeded, and the productivity of the new ley is compared with the existing grass which received equivalent manurial treatment.

24. Wintering cattle outdoors. The possibilities of wintering cattle outdoors for the whole or a large part of the winter months are being explored as part of the investigations into possible methods of reducing the cost of cattle rearing. Widely varying soil and climatic conditions are being covered at Drayton, Gleadthorpe and Liscombe Farms.

25. Pigs and sheep. The long-term breeding experiments with sheep (breeding from lambs and shearlings) and with pigs (comparison of two pure breeds and their reciprocal crosses followed by comparisons with cross-breed sows) continue to take up most of the stock available. In anticipation of further stock becoming available for experimental purposes, future lines of work with both pigs and sheep have been discussed.

26. Poultry. A six-year comparison of four systems of husbandry viz. fold units, colony houses, battery cages, and deep litter houses has been completed at Gleadthorpe. The battery cages were consistently superior in egg production, food conversion, mortality and seasonal production levels. The two intensive systems of management gave better results than the two extensive systems.

27. The facilities at Gleadthorpe are now being devoted to a long-term comparison of the results from breeding from stock houses for several generations intensively on deep litter, with those from birds on range.

28. At Great House, the results of comparisons of different degrees of insulation of deep litter houses were contrary to some of the research findings in that the heated and constant temperature houses did not show any economic advantage over those which were insulated. It has accordingly been decided to breed and rear stock intensively in a heated, constant temperature, house as had been done in the original research work, which indicated that there might be greater egg yields from birds kept under such conditions throughout their life.

29. At Trawscoed, the use of oats as the sole food for pullets being reared on range in place of a balanced mash has been shown to reduce the cost of rearing very considerably and to give a better egg yield over the year, although the oat-fed pullets came into lay rather later. This is now being tried out under standard conditions at the three Farms where poultry are maintained.

Crop Experiments on Experimental Husbandry Farms

30. The important series of long-term experiments on ley fertility, straw disposal, depth of ploughing, and manurial trials mentioned in the Council's last report are being continued. A number of shorter-term trials on arable crops are in progress and some have been completed.

31. Cereals. The work with cereals has been concentrated on reducing seeding rates and the influence of manuring. Fresh problems connected with manuring appear to arise as soon as experiments designed to answer others have been completed. The advent of the modern stiff-strawed varieties has opened out new possibilities of higher levels of manuring, particularly with nitrogen, and two ancillary questions on its use are now being investigated. Firstly, there are conflicting views about the value of seedbed and spring top dressings of nitrogen for winter cereals, and, secondly, information is required as to whether the full amounts of nitrogen can be combine-drilled for spring cereals without harming germination.

32. Seed potatoes. The effects of storage temperatures on seed potatoes combined with different conditions during the chitting period are being studied in a complex series of trials at Terrington, where a special storage house has recently been built.

33. Irrigation. Irrigation of farm as well as horticultural crops is increasing in many areas and the possibilities of extending the limited amount of work in this field have been discussed. Supplies of water, however, are available on only a few of the Farms. At Gleadthorpe, it is proposed to continue the study of the effect of irrigation on a rotation of crops in a modified form and to extend the work on potatoes.

34. Grass conservation. The efficient conservation and utilization of winter fodder is of the highest importance, and all suitable Farms are studying one or more aspects of the subject. Useful data are being obtained on the losses in silage making on a commercial farm scale, and different methods of handling or treating the grass are being compared at three centres. Experience is being gained in the operation of the hay drying units, particularly as to the best methods of loading the bales. Tripoding and baling hay are being compared at Bridget's, while cocking and tripoding are studied at Great House and compared with barn hay drying.

35. Variety trials. A considerable number of variety trials with cereals, potatoes etc. are conducted on the Farms in collaboration with the National Institute of Agricultural Botany and Rosemaund has become a Regional Centre for primary trials.

Experiments in the Regions

36. A wide diversity of experiments and observation studies is being carried out in the Regions on private farms. They are being increasingly co-ordinated on a subject basis, or over several Regions; and more projects dealing with livestock are being undertaken in all areas.

37. Much valuable knowledge in the rapidly expanding field of herbicides has been gained from Regional trials. Hundreds of secondary trials of crop varieties are undertaken in conjunction with the National Institute of Agricultural Botany.

38. Investigational work on the management of land restored after being worked for opencast coal and other minerals continues. A review of the more important findings up to the present time is contained in the fourth issue of *Experimental Husbandry*. This indicates that ordinary husbandry methods provide the best means of rehabilitation, but that manuring should be more generous than usual.

The fact that many soils lose their structure during the mining period is mentioned frequently and is now receiving study. Experiments on the restoration of land flooded by sea water in 1953 continue, and crops are now being grown to test the effects of the various treatments.

Dissemination of results

39. Special arrangements have been made to publicize the results of completed experiments and interim results of some long-term work. The first number of *Experimental Husbandry* was published in 1956 and has been followed by three further issues. This publication, written mainly for the farmer and adviser, is primarily devoted to accounts of National Agricultural Advisory Service experiments carried out at the Experimental Husbandry Farms and on commercial farms, but from time to time includes work at other centres.

40. Preparation of the annual publication *Results of Experiments on Experimental Husbandry Farms* has continued. The data in this booklet are only to be regarded as interim because the trials are still being continued and in many cases the results refer only to a single year's work. The information is circulated primarily to keep the National Agricultural Advisory Service fully informed of the progress of the experiments. Although still restricted in circulation the booklet is now being given a rather wider distribution to include Universities, Research Stations, and Farm Institutes.

41. The work of the Farms is publicized in a number of other ways. Background publicity has been given in the series of articles on the Farms in *Agriculture* and the inspiration of articles in the national, agricultural, and local weekly Press. Great House and Rosemaund have been featured in television programmes and N.A.A.S. officers have given a number of broadcasts. Detailed explanations of the experiments are given to the many thousands who visit the Farms each year and to parties touring experimental plots in the counties. Printed Farm guides issued to visitors contain a summary of the results of the experiments during the previous years.

Experimental Horticulture

42. Experimental Horticulture Stations. All the horticulture stations contemplated under the original scheme have been provided except for the one projected for East Anglia. The Council has reviewed the need for an East Anglian Station and considers that the establishment of a Station in this important horticultural area would be a suitable use of any funds which may be made available. The work of the Welsh Horticultural Demonstration Stations has been re-examined. The Council considers that the time has now come to start to make the Bryn Adda and the Cleppa Park Stations primarily experimental in character. The small Station at Trawscoed has been absorbed into the N.A.A.S. Regional Centre.

43. Experiments in the Regions. Horticultural crops do not lend themselves as readily as many farm crops to accurate experimentation on growers' holdings. The long harvest period and the number of recordings entailed over this period make it impossible for the grower to provide the facilities and difficult for the N.A.A.S. officers to do the work. Thus the bulk of the investigations must be located at the Stations. The distribution of projects between the Stations and commercial holdings, as shown by the table in paragraph 44, provides an interesting contrast with the similar table for agricultural experiments given in paragraph 17. Within the limitations mentioned, investigations on growers' holdings nevertheless produce much valuable information to supplement the results of work at the Stations.

Experimental Work in Progress

44. The numbers of experiments and observation studies carried out in the main subjects in 1956 and 1958 are shown in the following table:

	At Experimental Horticulture Stations and Demonstration Stations		*In N.A.A.S. Regions*	
	1956	1958	1956	1958
Top Fruit	28	26	31	74
Soft Fruit	57	50	32	41
Vegetables in the open	117	116	56	125
Flowers in the open	114	61	24	22
Hops	7	8	3	5
Glasshouse and protected crops	142	128	35	52
Others	1	25	1	3

The programme includes all aspects of commercial horticulture and the following paragraphs give some indication of the more important lines of work.

45. Bulbs and related crops. Work on bulbs and related crops is being carried out in the two contrasting areas of Cornwall and Lincolnshire, where bulb and early flower production is of special importance. The husbandry of bulb crops in the ground and the handling of bulbs and corms are covered by a wide range of trials including studies of methods of planting and harvesting, manuring, weed control, pests and diseases, and comparisons of varieties.

46. The slow response of bulb crops to different nutritional treatments makes it necessary for this work to continue for a long period. The difficulties and expense of controlling weeds, and the unsatisfactory results from experiments using flame machines, have stimulated work on the use of some of the new herbicides applied both before and after shoot emergence. Control of eelworms by hot water and dry heat methods, and the effect of treatment on the bulb, have featured largely in the work on pests. Anemone crops, important on the small holdings in Devon and Cornwall, have been giving disappointing results over the past few years and are accordingly receiving special attention both on the Stations and from N.A.A.S. Regional Specialists.

47. Flowers. Perhaps the most important line of work with flowers is variety trials. The aim is to sort out the large numbers of types on the market, and to provide reliable guidance on their performance under different conditions. Efforts are also being made to build up healthy stocks of some varieties for distribution to growers.

48. Recent developments in the cultivation of chrysanthemums, both under glass and in the open, have raised a number of problems. Most of the Stations are therefore conducting trials with this crop including controlling the day length, methods of producing rooted cuttings, and fitting the crop in with others in rotation in glasshouses. Interest in the gerbera is increasing among growers, and techniques of producing satisfactory crops in cold houses are being studied at Luddington.

49. Fruit. The Horticulture Stations work in close collaboration with the National Fruit Trials and provide facilities for testing both top and soft fruits under climatic conditions differing from those at Brogdale. At Stockbridge House, several kinds of top fruit are being tested under the somewhat unusual climatic conditions for fruit growing, to ascertain the possibilities of commercial orcharding in the area. At Rosewarne, test plantings of soft fruit were made to ascertain whether it would be possible to grow this crop successfully under the exposed conditions of the Station. It has now been decided that storm damage is so frequent that no results of value would be obtained.

50. Disease control trials are still a prominent feature of the work with fruit and several different spraying programmes are being compared. In certain selected cases herbicide experiments have been started where there would be no danger of upsetting future trials should there be any residual effects from the materials used. Many of the trials, especially those concerned with varieties and manuring, are of very long duration.

51. Glasshouse and protected crops. Studies of the construction, orientation, heating and ventilation of glasshouses, conducted in very close collaboration with the National Institute of Agricultural Engineering, are likely to be of great value to the industry. The efficient utilization of fuel is of ever-growing importance in view of its increasing cost. The work includes studies of different fuels, methods of firing boilers, comparisons of solid and oil fuel, and relative efficiencies of different systems of distribution of heat, and the effects of variations of temperature within houses on the yields and quality of crops. The work ranges from simple empirical observations of practical points, to detailed experiments involving elaborate instrumentation of the micro-climate within the houses and a large amount of recording. Preliminary results have shown the large effects of small variations in the conditions within a house, and stressed the importance of the studies of the conditions prevailing at different points in and around the crop.

52. Tomatoes, lettuce and chrysanthemums are the three main crops covered by glasshouse experiments. The water requirements of tomatoes, and the relative efficiency of various methods of applying water, are under detailed study. Included in this work are experiments on the application of nutrients dissolved in the water. Methods of soil sterilization, both by steaming and by the use of chemicals, and the effect of different conditioners are part of the study of methods of maintaining high fertility levels of soils under glass.

53. A wide variety of cultural practices, e.g. dates of sowing, of removal of lights, spacing of plants, are being examined with lettuces and other crops under frames and Dutch lights. These are repeated at several of the Stations and much useful information is being gained which is of interest both nationally and in particular districts. The selection of the most suitable varieties for growth under Dutch lights or cloches is a subject about which there was little exact knowledge before the trials were started a few years ago and much still remains to be done in this field.

54. To meet interest in mobile houses, small units are being provided at four Stations and the most effective cropping sequences are being worked out for different climatic conditions.

55. Shelter screens are important in many parts of the country and until recently there was little exact data on the relative efficiency of various natural and artificial types. Work on this is in progress and, in addition to studies of the effects of various artificial barriers, the suitability of various trees, hedge, and crop plants is being observed.

56. Vegetables. In conjunction with the National Institute of Agricultural Botany, a good deal of effort is being devoted to sorting out the confusion among the "varieties" of certain vegetables. This involves several years of detailed observation, measurement, and recording from a large number of plots sown with seed drawn from a wide range of sources before it is possible to proceed with variety trials. The variety trials are also carried out in co-operation with the National Institute of Agricultural Botany, and new breeding material is tested for the National Vegetable Research Station. Crops of special local importance are studied at some Stations, such as rhubarb at Stockbridge House, and asparagus at Luddington.

57. Irrigation trials on vegetable crops are in progress at three Stations. Much useful information is being collected on techniques for carrying out such experiments. The weather has such a marked influence on these trials that they will have to be repeated over a series of years before the result will be at all conclusive. A wide range of crops is included in these investigations and each may involve variety trials and special study of cultural practices and disease control.

58. Hops. The experiments on hops at the Rosemaund Experimental Husbandry Farm have suffered a severe set-back by the appearance of progressive Verticillium Wilt in one of the yards in which all the plants have had to be destroyed. Nevertheless, plans for continuing the work are in hand. The widespread introduction of picking machines emphasizes the need for information on the long-term effects of cutting the bines at an earlier date than is common with hand picking. This is one of several cultural practices under investigation.

59. Other work. The control of pests and diseases, and the problems of taint following the use of certain chemicals are included in trials with a number of crops at one or more Stations.

60. Dissemination of results. Reports on a number of experiments have been published in scientific journals such as the *Journal of Horticultural Science* and *Plant Pathology*. But to meet the need for a publication to include the more applied and cultural type of experiment it was decided to issue a new publication, *Experimental Horticulture*, complementary to *Experimental Husbandry*. Two numbers have already appeared. Publicity is also given to the experimental work on horticultural problems in many other ways on the same lines as for agriculture.

PART III

PROBLEMS CONSIDERED BY THE COUNCIL

61. The following paragraphs give an indication of the type of problems discussed by the Council.

LIVESTOCK

62. Weight recording of cattle. Advances in the feeding of livestock on scientific lines, and the need for efficient food conversion, have given rise to a need for liveweight measurement more specific than visual assessment. This can be done only by actual weighing of the animals, and with pigs it is now generally accepted practice. With beef cattle, however, little weighing is undertaken and the Agriculture Committee considered that weighing was essential if more critical production methods were to be developed. It accordingly suggested that a small pilot scheme should be provided in which weighing would be offered to a small number of farmers to find out whether the information was helpful to them. The N.A.A.S. had recently acquired some portable weighbridges for experimental work and one of these was used in a pilot study carried out in Cambridgeshire during the winter 1958-1959. The study showed that the machine could be used successfully for this purpose, and all the farmers stated that the information about liveweights of their cattle had been extremely useful in assessing feeding methods and in the marketing of their cattle. Further pilot trials are planned for the coming winter.

63. **Methods and costs of beef production.** The importance of home production of beef has led the Council to examine the costs and the methods of rearing and fattening cattle. Methods of production vary considerably in different parts of the country and in different farming systems and many developments have taken place recently in an endeavour to meet market demand and to reduce the costs of production. In the past, published information about the relative efficiency and profitability of the newer and the traditional systems has been based primarily on average results emerging from studies of beef production considered as an enterprise in itself. The Agriculture Committee therefore recommended that case studies should be undertaken to provide information on traditional methods and pioneer methods of production, and the impact of these methods on the farming system. Wherever possible it was thought that liveweight records of the cattle should be obtained.

64. Provincial Agricultural Economists and the N.A.A.S. together have designed a series of case studies at seven centres in England and Wales which, after one or two years, should give useful guidance on the relative value of various systems. Case studies are being made of, for example, single and multiple suckling, early weaning, outwintering, self-feeding of silage and the fattening of yarded cattle on silage. The A.I.C. for Scotland has co-operated and Scottish Agricultural Economists will undertake similar case studies of a number of beef production systems in Scotland.

65. **Milk quality.** The Council's Agriculture Committee has looked into some aspects of the compositional quality of milk with particular reference to solids-not-fat. Three specific aspects have received special attention by the Council. Firstly, attention was drawn to the need to review the existing compositional standards of milk with particular regard to the nutritional significance of solids-not-fat. The Government has appointed a committee under the chairmanship of Dr. J. W. Cook to consider the composition of milk sold off farms in the United Kingdom from the standpoint both of human nutrition and animal husbandry, and to recommend any legislative or other changes that may be desirable. Secondly, the Council made some suggestions, which were accepted, about the terms of warning letters sent by the Joint Milk Quality Control Committee to producers of milk of low compositional quality. Thirdly, the methods used by creameries and depots for determining solids-not-fat content and the accuracy with which tests are operated in practice have been discussed. The Milk Marketing Board have offered to test samples of milk where producers query results

notified to them by buyers and, in an effort to obtain uniform standards of efficiency in testing, have appointed officers to visit depots and advise.

66. The solids-not-fat content of milk may be affected by a number of factors, e.g. genetic character of the cow, feeding, the incidence of disease, stage of lactation, etc.; and although investigations have been in progress for many years the causes of and remedies for low solids-not-fat are still not fully known. A four-year investigation has been carried out by the N.A.A.S. in co-operation with the National Institute for Research in Dairying and the Milk Marketing Board in the Faringdon district of Berkshire. The survey failed to provide positive evidence that low solids-not-fat was directly traceable either to genetic or environmental factors, i.e. breeding or feeding. A follow-up experiment is being conducted under controlled conditions at the National Institute for Research in Dairying.

67. Blood type testing for cattle. The Council has considered the need for providing a blood type testing service in connection with cattle breeding. While appreciating the usefulness of such a service in helping to settle disputes about the parentage of calves and establishing the breeding of bulls whose semen it is proposed to export, the Council came to the conclusion that it could not recommend the setting up of a scheme under Government auspices. Research on blood type testing is in progress under the A.R.C. and that Council would be prepared to give such assistance as it could with technical advice and in training of workers if the Breed Societies were to set up a testing service.

68. Synthetic oestrogens. The Council has considered advice from the A.R.C. about the possible dangers associated with the administration of stilboestrol and hexoestrol for fattening livestock. It was agreed that publicity should be given to the information available and a short statement has been issued with special reference to dangers to breeding stock. The A.R.C. is enquiring into the behaviour of synthetic oestrogens excreted by animals. The results of experiments so far obtained indicate that the risk of the contamination of pastures and soil by accumulation is not serious, but until the results have been confirmed it cannot be asserted positively that there is no risk.

69. Feeding standards for livestock. The Council is finding out from the A.R.C. about the practicability of substantially improving existing scientific knowledge on animal feeding standards, particularly in relation to the greater use of bulky home-grown feedingstuffs. The development of simple methods of assessing the quality of some of the constituents of foodstuffs is under study and there is little doubt that the availability of a reliable and simple means of testing would be of considerable help.

70. Sheep. The Council has discussed the Report of the National Resources (Technical) Committee "The Sheep Industry in Britain: 1958" (H.M.S.O., 3s. 6d.). It endorsed the recommendation that further consideration should be given to the use of recording and progeny testing as a guide to the breeding of sheep. A number of private and small-scale schemes are already in operation, and the Ministry had been discussing with the National Sheep Breeders' Association the possibility of introducing a wider national scheme. The Council has set up a Committee to review what has been done and to recommend what further developments are desirable.

CROPS

71. Silage and fodder conservation. The results of demonstrations of silage fodder conservation carried out during 1953-56 with the help of Conditional Aid from America were presented to the Council in N.A.A.S. Technical Report No. 9. The aim was to demonstrate proven practices particularly applicable to the small farmer and to carry out a limited programme of investigation. The demonstrations showed the value of growing a worthwhile crop for silage, the importance of method in ensuring a good quality silage, and the value of good consolidation and of a satisfactory cover.

72. Experimental Husbandry Farm trials and a report on an investigation into the operation of barn hay drying plants on private farms in the years 1954-56 indicate that barn hay drying might suit the small farm better than silage. The need is to relate the use of silage to the particular system of farming and to make the best use of the available labour over the year. The main difficulties in the wide extension of silage appear to be labour, the clinging smell, the difficulty of fitting it into certain farming systems, the variability in quality, and the high waste arising from unsatisfactory silos or inadequate covering. The Council also reviewed work on fodder conservation at the Husbandry Farms on losses occurring in silage-making on a farm scale, different methods of silage making, the drying of baled hay, and bay tedding.

73. N.A.A.S. work on the use of sodium metabisulphite as an additive to silage showed that it can produce a high quality silage under certain conditions but where the pit could not be filled and consolidated quickly better results were obtained with molasses or with no additives at all. One of the difficulties with metabisulphite is ensuring its even distribution and its retention in the silage at an adequate level.

POULTRY

74. **Trends of the industry.** The poultry industry has expanded rapidly in recent years with a tendency towards the development of large units, though a hard core of small producers remains and probably always will. In the case of broiler production, development has been almost on factory lines. Intensive methods of this kind throw special emphasis on the need for first class hygiene to limit the effects of disease on production. Diseases such as the respiratory infections, fowl typhoid, and leucosis, present very intractable problems and cost the industry losses of the order of £8-£12 million each year.

75. The Council has approached the A.R.C. for an extension of poultry research, bearing in mind that expenditure on it might well bear a closer relation to the value of poultry products. About 13 per cent of the total agricultural income in England and Wales is now derived from poultry and eggs. The lack of knowledge of some aspects of avian physiology is mainly responsible for the slow progress so far made in poultry housing and incubator design.

76. The Council set up an ad hoc committee to consider the supply of trained people for poultry work. This Committee recommended that a new centre for teaching at national diploma and certificate level should be established as soon as suitable staff can be recruited; that the National Poultry Diploma Board should be encouraged to add to their present courses another one of higher standard; and that more publicity should be given to the facilities offered for training in poultry husbandry and poultry science and also to the posts available in the industry for trained people.

77. Improving strains of poultry. Poultry subjects dealt with by the Council in the past three years include the proposal to import U.S. strains of poultry for cross-breeding with our stocks with a view to improving them. There are several objections to this and the Council is by no means convinced that improvement would in fact result.

78. Poultry nutrition. The improved stock now available in this country and the smaller profit margins demand a greater knowledge of certain aspects of poultry nutrition. It is particularly desirable to extend our knowledge of the economical use of animal proteins and of the value of vegetable protein supplements. The Poultry Committee has this matter under continual review in relation to the priority to be given to poultry research problems.

79. Value of different breeding methods. Much more precise information is required about the value of various breeding methods which are being introduced into commercial practice. The Poultry Committee has fully discussed the question of breeding systems in relation to the supply of laying pullets and the design of the Poultry Progeny Testing Stations. They concluded that there was still a need for the progeny testing scheme, which forms the basis of the Breeders' Grade in the Poultry Stock Improvement Plan, but that some modifications of the original sample size and of the scoring might be desirable. There is also a need for some random sample testing of the end product and, in the case of the cross-breeds, for egg production. The arrangements for this, and the qualifications of these who could be eligible for submitting stock for testing, are now under consideration.

80. Other poultry matters. The Council has considered several other aspects of poultry husbandry, viz; the possible risk of feeding damaged grain to poultry, the use of fats in poultry feeding, pullet disease, the use of bark in deep litter, means of modifying the sex ratio at hatching by the use of oestrogen solutions, the use of A.I. in poultry husbandry, and infertility.

HORTICULTURE

81. Soil compaction in orchards. The possible importance of soil compaction as an adverse factor in orchards, has been recognized by the Council and referred to the A.R.C. as a subject warranting investigation. While soil compaction concerns all farmers, it is of greater significance in horticulture where the land is more often traversed by heavy equipment. Of particular importance in any investigation would be the improvement of means of measuring soil structure. The practical problems include determining the maximum load that particular soils can support without changing their natural qualities, and finding means of carrying out operations while keeping the loads below these limits.

82. Apple scab. Work on fundamental aspects of apple scab has continued at Rothamsted, East Malling and Long Ashton Research Stations, and special attention has been given to the influence of broken periods of leaf wetness on scab infection, and on the fungicidal characteristics of different materials.

83. Meanwhile the Plant Pathologists of the N.A.A.S. in collaboration with the Ministry's Plant Pathology Laboratory and Rothamsted Experimental Station are continuing a countrywide co-operative investigation on the detection and significance of Mills Periods (a recognised set of meteorological conditions), and looking into the possibility of instituting a forecasting or alerting service.

84. Diseases of mushrooms. The Horticulture Committee discussed this subject with the Director of the Glasshouse Crops Research Institute where work on this crop is now being done. The disease problem is very serious at the present time, especially as little is known of the cause of Watery Stipe, symptoms of which (under different names) have been observed for 20 years at least. Survey work has been done by the N.A.A.S. on the status of the disease and some observations being made at the Experimental Horticulture Stations will help in the investigations. The value of the crop is such that it ranks second in importance on the list of horticultural crops grown under protection.

85. Black currants. A review of the work in progress on black currants was considered with special reference to gall mite (big bud), on which no new work had been carried out for twenty years. A new appointment has been made at Long Ashton for work on this pest. The life history and migration of the mite, evaluation of new acaricides and relationships of the mite to the virus causing Reversion are important aspects of the problem. Work with the new sprays such as endrin in co-operative trials at East Malling, Long Ashton and by the N.A.A.S. is giving promising results.

86. Since copper sprays for the control of Leaf Spot tend to reduce the ascorbic acid content of the juice, alternatives are being sought. Work on the life history of the fungus is continuing at Long Ashton.

87. Quality of brassica seed stocks. The Council's Horticulture Committee has recognized the anxiety of growers and the seed trade alike over the variability in type and quality of commercial brassica seed stocks. With the assistance of the National Institute of Agricultural Botany and the N.A.A.S. it sponsored a useful conference at the National Vegetable Research Station which was attended by members of the seed trade and growers.

88. Storage of fruit, vegetables and flowers. The work done at the Department of Scientific and Industrial Research, Ditton Laboratory, as part of an extensive research programme, has been noted. Whilst the problems of the industry are broadly covered, it was thought that pre-cooling in its relation to pre-packing needed more attention, and that more work should be done on the storage and ripening of pears.

LAND MANAGEMENT

89. Buildings. Interest in farm buildings has been stimulated by the need for greater economy in the use of farm labour and new materials and by technical developments (e.g. in grain drying and storage, milking parlours and silos for ensilage). A welcome step has been the setting up by the A.R.C. of a Farm Buildings Research Committee with which the Land Management Committee maintains close liaison.

90. Some specific problems on which research seems needed have been brought to the attention of the A.R.C., e.g. certain building aspects of grain drying and storage, and the strength of silo walls. The Improvement Council has also sponsored a number of research projects including an investigation of the physical problems of condensation in cowhouses at the University of Durham; a study by the College of Estate Management of the length of life of various building materials under farm conditions; and an enquiry into the efficiency of a new set of farm buildings, (using work study methods) at the University College of North Wales, Bangor.

91. Survey of potential horticulture areas. An original piece of work being carried out by the Agricultural Land Service is a survey of areas suitable for horticultural development. Information on soil types, water supplies, climate, etc. is collated and the aim is to enable advisory officers to give useful information to growers contemplating moving to a different area or to anyone entering the industry. Surveys of Wales, the West Midlands and South-Western Regions have been completed and work on the South-East is in progress.

92. Bibliography of Rural Land Economy and Landownership. The Land Management Committee sponsored the compilation by the Department of Estate Management, Cambridge University, of a bibliography listing relevant material published in Britain from 1900-1957, some unpublished theses, and certain works published in the U.S.A. and Western Europe. This publication has been widely welcomed as providing a valuable work of reference.

93. Land drainage. Difficulty has been experienced in defining the practical problems of land drainage, but a good deal of preparatory work has been done that will assist in the preparation of a comprehensive memorandum for the Joint A.I.C., A.R.C. Committee.

94. Shelter research. The Land Management Committee has called attention to the problems of shelter affecting both crops and animals and, in order that they might be clearly defined and systematically presented, set up a Shelter Research Planning Group. The problems of shelter research formed the subject of a memorandum for the preparation of which gratitude is due to an officer of the Meteorological Office. This memorandum was considered by the Joint A.I.C.s/A.R.C. Committee and received by the Improvement Council in 1958. Besides problems with an agricultural bearing that would concern the A.R.C., there remained the meteorological, forestry, and economic aspects. The Shelter Research Planning Group was kept in being, therefore, to maintain general oversight and to co-ordinate the many lines of work indicated in the memorandum. The appointment of an adviser for the United Kingdom, who would keep in touch effectively with research work relevant to shelter and would act as liaison between the Group and interested organizations, is under consideration.

95. Work on the horticultural aspects of shelter is already in progress at Rosewarne Experimental Horticulture Station with the object of comparing the effects of various forms of natural and artificial shelter on growth and yield of crops. Experimental work on shelter belts is being planned for Pwllpeiran Experimental Husbandry Farm. Three university departments have begun research into aspects of shelter. Durham is carrying out a survey of existing shelter belts and their effects on local climate, soil fertility etc. and making a preliminary study of the effect of natural and artificial shelter on the behavious of ewes and lambs. The University College of Wales, Aberystwyth is measuring the amount of shelter afforded by the natural topography of an area and the extent to which livestock use it. The University College of North Wales, Bangor has introduced three shelter belts of different shapes on hill land and intends to study their effect on a flock of mountain sheep and on a herd of cows.

MISCELLANEOUS PROBLEMS

96. Soil surveys. There is an urgent need for soil survey maps of this country particularly in relation to agricultural and horticultural advisory work. The present scale of mapping is on a scale of 6in. to the mile. The urgent need for surveying the whole of the country more rapidly, by means of reconnaissance mapping on the 1in. to 1 mile scale, put forward by the N.A.A.S., has been recognised by the Council and accepted by the Soil Survey Research Board. Surveys of this type are now in hand. This decision greatly increases the prospect of putting advisory work and land utilization schemes on a sounder and more accurate basis than has been possible in the past. Some detailed mapping on the 6in. scale will still be necessary in new areas.

97. **Bracken control.** The area infested by bracken in England and Wales has been estimated at some ½ million acres, half of which is considered to be unimprovable. The remainder is intermediate in character or is potentially arable. Bracken can be cleared in certain lower lying areas by ploughing and reseeding; in some steep rocky areas eradication is bound to be uneconomic because of the poor and remote nature of the land. The problem of the intermediate areas offers most scope for an economic and effective method of eradication. Research continues on chemical methods of bracken control and several promising spray materials are being tried out.

98. **Work study.** There has been increasing interest in the application of work study techniques to agriculture. In 1957 the Council set up an ad hoc Committee to consider the best means of promoting work study. The Committee has discussed the subject from time to time and has made a number of suggestions to the Ministry.

99. The furtherance of work study in the industry is being undertaken in several ways. Two special twelve-week courses generously provided by I.C.I. have been attended by representatives of a wide range of agricultural interests including the Ministry's advisory services. The purpose of these courses is to provide a nucleus of well trained persons capable, after further practical experience, of training others who will in turn through lectures and demonstrations acquaint farmers and growers with the scope and possibilities of work study.

100. A primary requirement for progress in work study is the collection of planning data and standards applicable to activities in various farming systems. The Ministry advisory officers who attended the I.C.I. course are now undertaking exercises to provide the necessary data. Concurrently, appreciation courses for advisory officers are being held in every region so that they may give a measure of work study advice in their day to day work and acquaint farmers with its potentialities.

101. The British Productivity Council has set up an Agricultural Productivity Committee, composed of representatives of the industry and government departments, to recommend means of promoting productivity including the technique of work study. At the suggestion of the Committee, the Ministry has discussed with representatives of the Universities and Colleges the extent to which work study might be included in degree, post-graduate, and diploma courses. The need for a special course of about three months duration for the work study specialist was recognized, and is being followed up.

102. A number of other organizations are undertaking work study activities. These include the National Institute of Agricultural Engineering, including the Farm Buildings Unit of the A.R.C.; University College of North Wales, Bangor; Cambridge University Department of Estate Management; Reading University; and several University Departments of Agricultural Economics. Co-operative

Societies and other private concerns provide commercial work-study services for farmers.

103. A satisfactory flow of literature on work study is appearing. Articles frequently appear in the agricultural and horticultural press. Universities and research institutes and individuals publish the results of their investigations.

104. Ditch maintenance. There is no doubt that many ditches put in order or newly dug with grant aid during and subsequent to the war are falling into neglect. The reasons most frequently given are cost, shortage of labour and the unattractive nature of the work. To alleviate the situation the National Institute of Agricultural Engineering and the Ministry's drainage engineers have designed new machinery for ditching and maintenance. Within the last year the prototypes of two such machines have been successfully demonstrated publicly, and it is hoped they will be put into commercial production for sale either to farmers or to contractors and machinery syndicates.

105. Spray drift damage to crops. The question of damage to horticultural and other crops from the drift of herbicide sprays has continued to receive attention. The use of these sprays is increasing and, particularly in areas of mixed agriculture and horticulture, damage is liable to occur unless care is taken. Very serious losses can be incurred when valuable horticultural crops are affected.

106. Much is being done to improve the position through research, publicity and advice. The Ministry has had valuable assistance from the National Farmers' Union, the British Weed Control Council and other bodies in bringing home to those concerned the dangers associated with spraying. The N.A.A.S. takes every opportunity of stressing the need for care. An advisory leaflet has been prepared and in the last two years has been sent to individual farmers in the areas where damage is most likely to occur. Extensive press and radio publicity is being continued.

107. Concurrently, the A.R.C. has called meetings of research workers to intensify investigational work on the problems of spray drift and the Ministry is making a grant to the University of Nottingham for studies which should lead to a better understanding of its causes and help towards the formulation of remedial measures.

108. Meat research. The establishment of a Meat Research Centre was recommended to the Agricultural Ministers by the Technical Advisory Committee on Meat Research. Their proposal was supported by a report prepared by Dr. J. R. Vickery, an Australian expert from the Commonwealth Scientific and Industrial Research Organization, whose services were generously lent by the Australian Government. In preparing his report, Dr. Vickery spent some four and a half months in the United Kingdom, making a comprehensive survey of livestock and meat production problems. The recommendations of the Technical Advisory Committee and Dr. Vickery's report were referred to the Council which gave its support.

109. Birds and mammals harmful to agriculture. The programme of research of the Ministry's Infestation Control Division, and the progress made, is reviewed by the Council from time to time. The work includes observations on the ecology and behaviour of harmful mammals, and the behaviour of harmful birds. It has been shown, for instance, that both rats and foxes have some hitherto unsuspected sources of food. Rats will readily subsist on plant roots, seeds, earth worms, and snails; and foxes, showing the same kind of adaptability, will readily take plant food such as berries in addition to live animals and carrion. The anticoagulant rodenticides have proved to be outstandingly successful against both rats and mice. Work on myxomatosis has continued and the principal natural vector of disease, the rabbit flea, is being studied. At the Ministry's Veterinary Laboratory, Weybridge, it has been shown that it is now possible, by means of a gel-diffusion precipitin test, rapidly to distinguish between rabbits that are susceptible or immune to myxomatosis, or those which are infected with it but show no lesions. Weaker strains of the myxoma virus have arisen but immunity from the virulent strain is not passed on to the progeny. With the help and cooperation of the National Institute of Agricultural Engineering, a number of humane rabbit traps and vermin traps have been tested and officially approved.

110. Work on the movement of wood-pigeons has shown that there appears to be little or no migration of foreign birds into England and Wales, at least over the south and south-east coasts. It has been shown that the destruction of wood-pigeon nests, if done efficiently and on a co-operative basis in late summer, is a useful additional method for controlling these birds. Work on narcotized bait has been unpromising. Investigational work is in progress on damage to fruit buds, especially by bullfinches, and on the sense of taste of birds with the object of putting the selection of bird repellents on a less empirical basis. The bullfinch can be readily trapped by the correct use and siting of cage traps.

111. Nematode pests. The problems arising from Potato Root eelworm and Cereal Root eelworm were reviewed in the Council's Third Report. The position has improved, though both these pests respectively continue to be a potential threat to the extension of potato and cereal growing. Losses from Potato Root eelworm are not so extensive now that the potato acreage has fallen below the level reached during the war and just after, but the pest is still a constant irritant to our export trade.

Two other eelworms have since caused concern, viz. Pea Root eelworm and Lucerne Stem eelworm.

112. Pea Root eelworm. In common with other cyst forming eelworms the larval stage of Pea Root eelworm invades the roots and interferes with the nutrition of the host plant, causing severe stunting and yellowing. The pea crop suffers most; broad beans, field beans and vetches are less severely attacked but may suffer from heavy infestations; runner beans, French beans and sweet peas are unaffected. The rise in importance of this problem follows the rapid increase in the acreage of peas grown for processing, canning, and freezing. The immediate need is to ensure that the eelworm populations do not build up to more serious proportions through the continuous cropping of the host plant on the same land. Some control of the frequency of cropping with peas in the vining pea areas has already been achieved by voluntary action between the growers and the processors. The Council has recommended intensification of these voluntary measures of control, accompanied by preparations for speedy introduction of legislation should this be proved necessary in the future. Other recommendations were that a review of the research programme should be undertaken, and that present arrangements for giving advice to pea growers should be examined.

113. Lucerne Stem eelworm. Although Lucerne Stem eelworm is perhaps an even more serious potential danger than Pea Root eelworm, the number of field cases is as yet relatively small and the prospects of dealing with it satisfactorily are brighter. The fact that a two years' absence of the crop eradicates Lucerne Stem eelworm from the soil affords one means of control, and as the eelworm is seedborne good results may be expected from fumigation of seed stocks. Proposals for control measures are under consideration.

114. Irrigation. This subject has been under constant review by the Land Management and Horticulture Committees in consultation with the A.R.C. There is no lack of interest in research institutes on fundamental problems of immediate help to applied programmes; and the A.R.C. will seek to encourage greater interest in the water relations of whole plants as a subject of university research.

115. Irrigation was recognized to be one of the more important aspects in the production of horticultural crops, and availability of water was one factor taken into consideration in the Land Management Committee's survey of potential horticultural areas. Information has also been collected by the engineers of the Ministry's Land Drainage and Water Supplies Division and the Field Drainage, Water Supplies and Other Services Sub-Committee in collaboration with the N.A.A.S., farmers, and the University of Reading.

116. The Council recognizes the need for a clearer appreciation of the effect of irrigation on individual crops and the financial return in the context of the overall economy and total available water resources. A review of the problems of irrigation by the Joint A.I.C.s/A.R.C. Committee is proposed.

117. Slugs. Damage by slugs to agricultural crops, especially to wheat, and to a lesser extent to potatoes has been giving increasing concern in recent years. The amount of damage to wheat is comparable to that caused by wheat bulb fly. Recognising the importance of the pest, the Council has referred the problems to the A.R.C. for consideration as to what further research may need to be undertaken.

118. Frit fly. The Council has considered the problem of frit fly in the light of a memorandum from the Plant Pathology Laboratory. The economic status of the the pest has been accurately assessed by N.A.A.S. entomologists over a period of twelve years. In addition to causing losses in oats running into several millions of pounds a year, it attacks a number of cultivated grasses and it is a potentially serious adverse factor in the establishment of new leys. Research is in progress on various aspects of frit fly and the Council has drawn the attention of the A.R.C. to the desirability of further physiological and ecological studies.

We have the honour to be,

Sir,

Your obedient servants,

(*Signed*) A. J. D. Winnifrith (*Chairman*)
F. L. Engledow (*Vice-Chairman*)
J. F. Bomford
Harold Collison
Hugh Finn
E. Gibby
K. Mather

J. W. S. Mount
Netherthorpe
Northumberland
H. J. Rathbone
F. Rayns
E. J. Roberts
W. K. Slater
H. Cole Tinsley
T. Wallace
Jas. A. S. Watson
E. G. White
W. Morley Davies (*Secretary*)

11th June, 1959

APPENDIX A

COMMITTEES OF THE COUNCIL AND THE A.I.C.s/A.R.C. JOINT COMMITTEE

1. Agriculture Committee

Membership

Professor Sir Frank Engledow (*Chairman*)
Mr. C. H. Blagburn
Professor M. McG. Cooper
Professor W. Ellison
Mr. E. Gibby
Sir Joseph B. Hutchinson
Mr. J. A. McMillan
Mr. Dick Merricks
Mr. E. M. Owens
Mr. R. B. Peacock
Mr. H. J. Rathbone
Mr. F. Rayns
Professor H. G. Sanders
Mr. R. B. Ferro (*Convener*)

Terms of Reference

"To advise the Council on the problems of agriculture (including farm management, farming organization, husbandry practices, and farming systems) needing further scientific investigation; to keep under review the progress of research into matters concerning the industry and to advise on the practical application of the results of research; and to advise on any other matters referred to them."

2. Horticulture Committee

Membership

Captain J. F. Bomford (*Chairman*)
Dr. R. H. Barnes
Dr. K. S. Dodds
Mr. A. H. Hiller
Professor J. P. Hudson
Mr. J. W. S. Mount
Mr. P. J. Moss
Mr. L. C. Madsen
Mr. C. E. Hudson (*Convener*)

Terms of Reference

"To advise the Council on the problems of the horticulture industry needing further scientific investigation; to keep under review the progress of research into matters concerning the industry and to advise on the practical application of the results of research; and to advise on any other matters referred to them."

3. Land Management Committee

Membership

His Grace the Duke of Northumberland (*Chairman*)
Mr. W. G. Alexander
Mr. J. T. Beresford
The Earl of Bradford
Mr. H. Collison
Dr. D. R. Denman
Major E. S. Dobb
Mr. Arthur Jones
Mr. H. J. Rathbone
Mr. H. E. G. Read
Professor E. J. Roberts
Professor F. Sewell-Bray
Mr. C. Robinson (*Convener*)

Terms of Reference

"To keep under review the progress of research in land management subjects with a view to seeing that results are made known among those responsible for the management of land and to encourage the use of improved technical methods and the adoption of new and improved designs, and to advise the Council from time to time on land management subjects which appear to require scientific investigation and, generally, as to the lines on which policy designed to raise the technical and economic standards of land management can best be implemented."

4. Poultry Committee

Membership

Mr. H. R. Finn (*Chairman*)
Mr. R. P. Askew
Dr. R. F. Gordon
Mr. G. G. Guttridge
Dr. S. C. Kon
Mr. A. E. Maddison
Mrs. D. M. Mussellwhite
Dr. R. Osborne
Mr. A. R. Pendry
Mr. J. Sutton
Dr. H. Temperton
Mr. C. Thornber
Mr. W. J. Welford
Dr. R. Coles (*Convener*)

Terms of Reference

"To advise the Council on the problems of the poultry industry needing further scientific investigation; to keep under review the progress of research into matters concerning the industry and to advise on the practical application of the results of research; to give scientific advice on the Poultry Stock Improvement Plan and other measures designed to improve the quality of poultry stock; and to advise on any other matters referred to them."

5. Experimental Husbandry Committee

Membership

F. Rayns (*Chairman*)
A.I.C. Representatives
Mr. E. Gibby
The Lord Netherthorpe
Professor Sir James Scott Watson
A.R.C. Representatives
Dr. E. E. Cheeseman
Sir William Ogg
Dr. R. Scarisbrick
N.A.A.S. Representatives
Mr. W. Longrigg
Sir Robert Rae
Dr. D. H. Robinson
Professor H. G. Sanders
Dr. R. F. Gordon } *Choirmen of Sub-Committees ex officio*
P. J. Macfarlan (*Convener*)

Terms of Reference

"To receive and consider proposals for investigational work by the National Agricultural Advisory Service on Experimental Husbandry Farms and elsewhere; to make recommendations to the Ministry as to the work to be undertaken, and as to the allocation of the facilities available at the several Experimental Husbandry Farms, and to report accordingly to the Council; to advise the Ministry on the suitability of properties for use as Experimental Husbandry Farms; and to receive periodic reports on the conduct of the investigational work within its purview."

6. Experimental Horticulture Committee

Membership

Professor T. Wallace (*Chairman*)
A.I.C. Representatives
Captain J. F. Bomford
Mr. J. W. S. Mount
A.R.C. Representatives
Mr. G. Samuel
Professor O. V. S. Heath
N.A.A.S. Representatives
Mr. O. G. Dorey
Sir Robert Rae
Agricultural Economist
Dr. L. G. Bennett
Mr. P. J. Macfarlan (*Convener*)

Terms of Reference

"To receive and consider proposals for investigational work by the National Agricultural Advisory Service on Experimental Horticulture Stations and elsewhere; to make recommendations to the Ministry as to the work to be undertaken, and as to the allocation of the facilities available at the several Experimental Horticulture stations, and to report accordingly to the Council;

to advise the Ministry on the suitability of properties for use as Experimental Horticulture Stations; and to receive and consider periodic reports on the conduct of the investigational work within its purview."

7. Joint Committee of the Agricultural Improvement Councils and the Agricultural Research Council

Membership

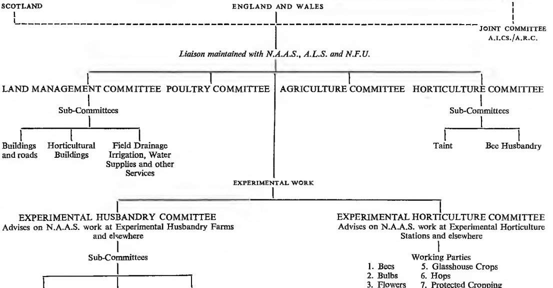
Sir Edward Salisbury (*Chairman*)
A.I.C. for England and Wales
Professor Sir James Scott Watson
Mr. H. Cole Tinsley
A.R.C.
Sir Solly Zuckerman
Mr. F. Rayns
A.I.C. for Scotland
Dr. Joseph Duncan
Professor A. B. Stewart
Mr. W. Morley Davies (*Secretary*)

Terms of Reference

1. "To review from time to time the technical problems of agriculture and horticulture,
2. "To recommend priorities and the importance which should be attached to particular problems,
3. "To review existing research in each particular field in relation to the needs of the industry and advise the Councils as to its adequacy,
4. "To consider any other matters which may be referred to it from time to time by the three Councils."

APPENDIX B

AGRICULTURAL IMPROVEMENT COUNCIL FOR ENGLAND AND WALES



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